

FCC Test Report

Report No.: RF150907C14A

FCC ID: D87-UZB3-HSG

Test Model: ACC-UZB3-HSG

Received Date: May 26, 2016

Test Date: Jun. 02 ~ Jun. 04, 2016

Issued Date: Jun. 06, 2016

Applicant: Sigma Designs, Inc.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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Release Control Record

Issue No.	Description	Date Issued
RF150907C14A	Original release.	Jun. 06, 2016

1 Certificate of Conformity

Product: Z-Wave USB Stick

Brand: Sigma Designs

Test Model: ACC-UZB3-HSG

Sample Status: Engineering sample

Applicant: Sigma Designs, Inc.

Test Date: Jun. 02 ~ Jun. 04, 2016

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.249)
ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Celine Chou , **Date:** Jun. 06, 2016
Celine Chou / Specialist

Approved by : Ken Liu , **Date:** Jun. 06, 2016
Ken Liu / Senior Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.249)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -14.82dB at 1.95703MHz.
15.209 15.249 15.249 (d)	Radiated Emission Test Band Edge Measurement Limit: 50dB less than the peak value of fundamental frequency or meet radiated emission limit in section 15.209	Pass	Meet the requirement of limit. Minimum passing margin is -1.0dB at 923.10MHz.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.86 dB
	200MHz ~ 1000MHz	3.87 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Z-Wave USB Stick
Brand	Sigma Designs
Test Model	ACC-UZB3-HSG
Status of EUT	Engineering sample
Power Supply Rating	5Vdc (Host equipment)
Modulation Type	2GFSK
Transfer Rate	100kbps
Operating Frequency	920.90MHz, 921.70MHz, 923.10MHz
Number of Channel	3
Antenna Type	Helical antenna with -1.13dBi gain
Accessory Device	N/A
Data Cable Supplied	N/A

Note: The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

3 channels are provided for EUT:

Channel	Frequency (MHz)	Transfer Rate (kbps)
1	920.90	100
2	921.70	100
3	923.10	100

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO			DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	
-	√	√	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz & Bandedge Measurement
RE<1G: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

Radiated Emission Test (Above 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
1	920.90MHz	2GFSK
2	921.70MHz	2GFSK
3	923.10MHz	2GFSK

Radiated Emission Test (Below 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
1	920.90MHz	2GFSK
2	921.70MHz	2GFSK
3	923.10MHz	2GFSK

Power Line Conducted Emission Test:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
1	920.90MHz	2GFSK
2	921.70MHz	2GFSK
3	923.10MHz	2GFSK

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE $\geq$ 1G	16deg. C, 70%RH	120Vac, 60Hz	Nick Hsu
RE<1G	16deg. C, 70%RH	120Vac, 60Hz	Nick Hsu
PLC	28deg. C, 66%RH	120Vac, 60Hz	Alan Wu

3.3 Description of Support Units

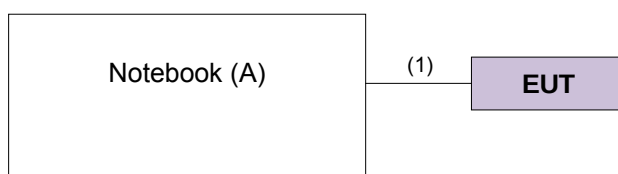
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	ASUS	P2420L	FCNXCV16385351D	FCC DoC Approved	-

Note: All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	1.8	Y	0	-

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.249)

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

Note: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

4 Test Types and Results

4.1 Radiated Emission Measurement

4.1.1 Limits of Radiated Emission Measurement

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 ~ 928 MHz	50	500
2400 ~ 2483.5 MHz	50	500
5725 ~ 5875 MHz	50	500
24 ~ 24.25 GHz	250	2500

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits as below table, whichever is the lesser attenuation

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	$2400/F(\text{kHz})$	300
0.490 ~ 1.705	$24000/F(\text{kHz})$	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = $20 \log$ Emission level ($\mu\text{V}/\text{m}$).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Apr. 18, 2016	Apr. 17, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Sep. 02, 2015	Sep. 01, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Jan. 07, 2016	Jan. 06, 2017
HORN Antenna SCHWARZBECK	9120D	209	Jan. 20, 2016	Jan. 19, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Jan. 18, 2016	Jan. 17, 2017
Preamplifier Agilent	8447D	2944A10738	Oct. 18, 2015	Oct. 17, 2016
Preamplifier Agilent	8449B	3008A01964	Aug. 22, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (214378)	Aug. 22, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 106	Cable-CH3-03 (309224+12738)	Aug. 22, 2015	Aug. 21, 2016
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 3.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 988962.
5. The IC Site Registration No. is IC 7450F-3.

4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

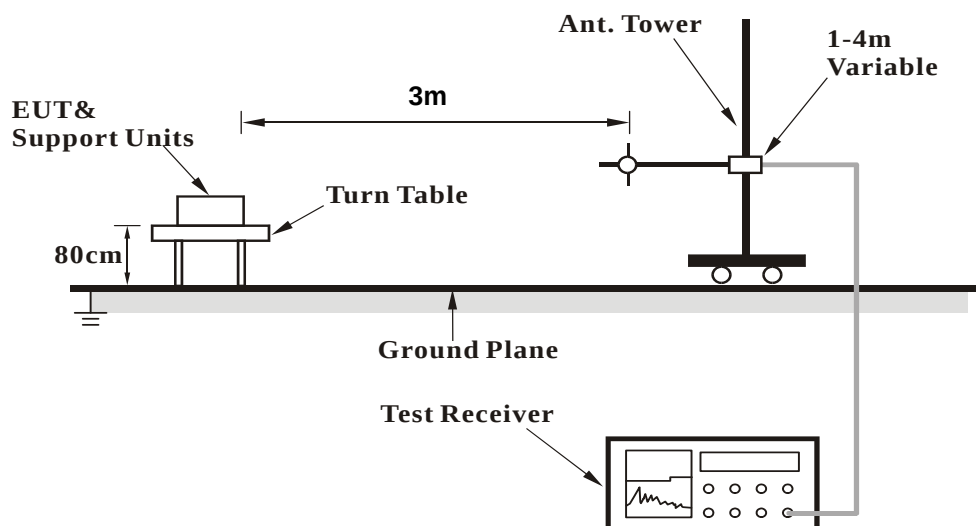
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

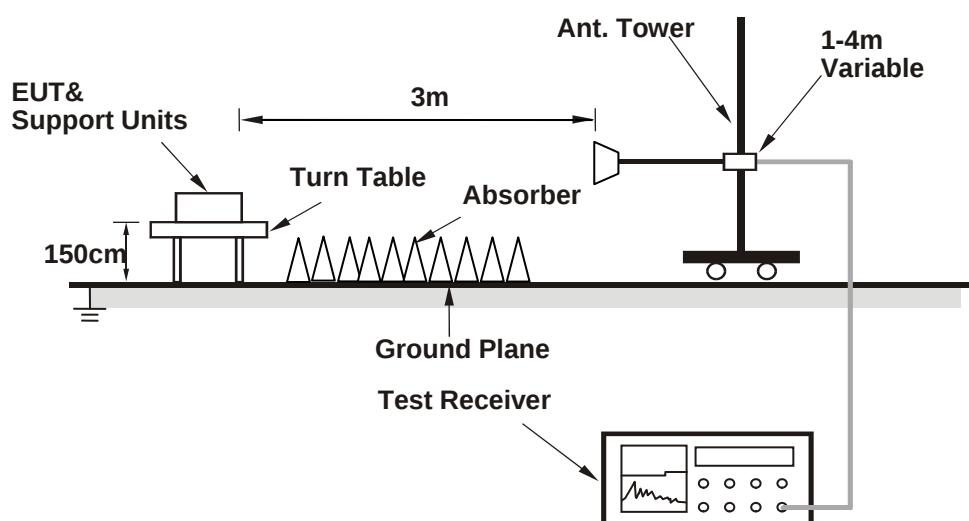
No deviation.

4.1.5 Test Set Up

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1 (920.90MHz)	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz (System)	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	16deg. C, 70%RH	TESTED BY	Nick Hsu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*920.90	93.1 PK	114.0	-20.9	1.53 H	136	64.6	28.5
2	*920.90	92.9 AV	94.0	-1.1	1.53 H	136	64.4	28.5
3	928.00	37.7 PK	43.1	-5.4	1.53 H	136	9.0	28.7
4	928.00	33.8 AV	42.9	-9.1	1.53 H	136	5.1	28.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*920.90	92.7 PK	114.0	-21.3	1.03 V	164	64.2	28.5
2	*920.90	92.2 AV	94.0	-1.8	1.03 V	164	63.7	28.5
3	928.00	37.8 PK	42.7	-4.9	1.03 V	164	9.1	28.7
4	928.00	33.5 AV	42.2	-8.7	1.03 V	164	4.8	28.7

Remarks:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “ : Fundamental frequency

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 2 (921.70MHz)	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz (System)	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	16deg. C, 70%RH	TESTED BY	Nick Hsu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*921.70	92.6 PK	114.0	-21.4	1.52 H	133	64.1	28.5
2	*921.70	92.4 AV	94.0	-1.6	1.52 H	133	63.9	28.5
3	928.00	39.6 PK	42.6	-3.0	1.52 H	133	10.9	28.7
4	928.00	34.6 AV	42.4	-7.8	1.52 H	133	5.9	28.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*921.70	91.6 PK	114.0	-22.4	1.00 V	163	63.1	28.5
2	*921.70	91.3 AV	94.0	-2.7	1.00 V	163	62.8	28.5
3	928.00	37.7 PK	41.6	-3.9	1.00 V	163	9.0	28.7
4	928.00	33.4 AV	41.3	-7.9	1.00 V	163	4.7	28.7

Remarks:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * ” : Fundamental frequency

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 3 (923.10MHz)	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz (System)	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	16deg. C, 70%RH	TESTED BY	Nick Hsu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*923.10	93.3 PK	114.0	-20.7	1.48 H	132	64.8	28.5
2	*923.10	93.0 AV	94.0	-1.0	1.48 H	132	64.5	28.5
3	928.00	37.8 PK	43.3	-5.5	1.48 H	132	9.1	28.7
4	928.00	33.9 AV	43.0	-9.1	1.48 H	132	5.2	28.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*923.10	92.6 PK	114.0	-21.4	1.01 V	163	64.1	28.5
2	*923.10	92.3 AV	94.0	-1.7	1.01 V	163	63.8	28.5
3	928.00	38.1 PK	42.6	-4.5	1.01 V	163	9.4	28.7
4	928.00	34.8 AV	42.3	-7.5	1.01 V	163	6.1	28.7

Remarks:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * ” : Fundamental frequency

Above 1GHz Worst-Case Data:

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1 (920.90MHz)	FREQUENCY RANGE	1 ~ 10GHz
INPUT POWER	120Vac, 60 Hz (System)	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	16deg. C, 70%RH	TESTED BY	Nick Hsu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	1841.80	38.2 PK	74.0	-35.8	1.83 H	69	41.8	-3.6
2	1841.80	25.2 AV	54.0	-28.8	1.83 H	69	28.8	-3.6
3	2762.70	45.5 PK	74.0	-28.5	1.46 H	76	45.7	-0.2
4	2762.70	41.7 AV	54.0	-12.3	1.46 H	76	41.9	-0.2
5	4604.50	46.5 PK	74.0	-27.5	3.20 H	74	41.8	4.7
6	4604.50	38.0 AV	54.0	-16.0	3.20 H	74	33.3	4.7
7	8288.10	55.7 PK	74.0	-18.3	2.64 H	60	42.1	13.6
8	8288.10	45.4 AV	54.0	-8.6	2.64 H	60	31.8	13.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	1841.80	37.9 PK	74.0	-36.1	1.83 V	69	41.5	-3.6
2	1841.80	25.8 AV	54.0	-28.2	1.83 V	69	29.4	-3.6
3	2762.70	47.8 PK	74.0	-26.2	1.46 V	76	48.0	-0.2
4	2762.70	44.5 AV	54.0	-9.5	1.46 V	76	44.7	-0.2
5	4604.50	48.2 PK	74.0	-25.8	3.20 V	74	43.5	4.7
6	4604.50	42.2 AV	54.0	-11.8	3.20 V	74	37.5	4.7
7	8288.10	56.2 PK	74.0	-17.8	2.64 V	60	42.6	13.6
8	8288.10	47.9 AV	54.0	-6.1	2.64 V	60	34.3	13.6

Remarks:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 2 (921.70MHz)	FREQUENCY RANGE	1 ~ 10GHz
INPUT POWER	120Vac, 60 Hz (System)	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	16deg. C, 70%RH	TESTED BY	Nick Hsu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	1843.40	38.9 PK	74.0	-35.1	2.57 H	49	42.5	-3.6
2	1843.40	27.7 AV	54.0	-26.3	2.57 H	49	31.3	-3.6
3	2765.10	48.0 PK	74.0	-26.0	2.72 H	168	48.2	-0.2
4	2765.10	44.7 AV	54.0	-9.3	2.72 H	168	44.9	-0.2
5	4608.50	46.8 PK	74.0	-27.2	2.33 H	153	42.1	4.7
6	4608.50	37.9 AV	54.0	-16.1	2.33 H	153	33.2	4.7
7	8295.30	55.8 PK	74.0	-18.2	2.46 H	352	42.2	13.6
8	8295.30	44.8 AV	54.0	-9.2	2.46 H	352	31.2	13.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	1843.40	38.1 PK	74.0	-35.9	2.57 V	49	41.7	-3.6
2	1843.40	25.8 AV	54.0	-28.2	2.57 V	49	29.4	-3.6
3	2765.10	48.4 PK	74.0	-25.6	2.72 V	168	48.6	-0.2
4	2765.10	45.2 AV	54.0	-8.8	2.72 V	168	45.4	-0.2
5	4608.50	48.3 PK	74.0	-25.7	2.33 V	153	43.6	4.7
6	4608.50	41.1 AV	54.0	-12.9	2.33 V	153	36.4	4.7
7	8295.30	56.8 PK	74.0	-17.2	2.46 V	352	43.2	13.6
8	8295.30	48.0 AV	54.0	-6.0	2.46 V	352	34.4	13.6

Remarks:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 3 (923.10MHz)	FREQUENCY RANGE	1 ~ 10GHz
INPUT POWER	120Vac, 60 Hz (System)	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	16deg. C, 70%RH	TESTED BY	Nick Hsu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	1846.20	37.6 PK	74.0	-36.4	3.70 H	205	41.2	-3.6
2	1846.20	24.9 AV	54.0	-29.1	3.70 H	205	28.5	-3.6
3	2769.30	46.3 PK	74.0	-27.7	2.89 H	90	46.5	-0.2
4	2769.30	42.2 AV	54.0	-11.8	2.89 H	90	42.4	-0.2
5	4615.50	46.6 PK	74.0	-27.4	3.22 H	92	41.9	4.7
6	4615.50	35.4 AV	54.0	-18.6	3.22 H	92	30.7	4.7
7	8307.90	55.4 PK	74.0	-18.6	3.35 H	42	41.8	13.6
8	8307.90	43.0 AV	54.0	-11.0	3.35 H	42	29.4	13.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	1846.20	37.6 PK	74.0	-36.4	3.70 V	205	41.2	-3.6
2	1846.20	24.9 AV	54.0	-29.1	3.70 V	205	28.5	-3.6
3	2769.30	47.0 PK	74.0	-27.0	2.89 V	90	47.2	-0.2
4	2769.30	43.5 AV	54.0	-10.5	2.89 V	90	43.7	-0.2
5	4615.50	47.2 PK	74.0	-26.8	3.22 V	92	42.5	4.7
6	4615.50	39.4 AV	54.0	-14.6	3.22 V	92	34.7	4.7
7	8307.90	56.0 PK	74.0	-18.0	3.35 V	42	42.4	13.6
8	8307.90	46.3 AV	54.0	-7.7	3.35 V	42	32.7	13.6

Remarks:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

Below 1GHz Worst-Case Data:

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1 (920.90MHz)	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz (System)	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	16deg. C, 70%RH	TESTED BY	Nick Hsu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	191.34	34.7 QP	43.5	-8.8	1.50 H	220	51.1	-16.4
2	214.67	35.6 QP	43.5	-7.9	1.01 H	117	51.6	-16.0
3	359.77	41.5 QP	46.0	-4.5	1.00 H	176	52.6	-11.1
4	383.79	38.6 QP	46.0	-7.4	1.01 H	155	49.1	-10.5
5	611.22	35.6 QP	46.0	-10.4	1.50 H	183	41.2	-5.6
6	928.00	39.9 QP	46.0	-6.1	1.50 H	191	39.4	0.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	39.72	35.1 QP	40.0	-4.9	1.00 V	280	50.4	-15.3
2	74.71	29.8 QP	40.0	-10.2	1.00 V	138	47.3	-17.5
3	142.75	31.0 QP	43.5	-12.5	1.00 V	231	45.3	-14.3
4	226.33	33.9 QP	46.0	-12.1	1.49 V	215	49.9	-16.0
5	358.52	37.9 QP	46.0	-8.1	1.49 V	139	49.1	-11.2
6	928.00	36.8 QP	46.0	-9.2	1.49 V	15	36.3	0.5

Remarks:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 2 (921.70MHz)	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz (System)	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	16deg. C, 70%RH	TESTED BY	Nick Hsu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	80.54	33.2 QP	40.0	-6.8	2.00 H	149	51.9	-18.7
2	101.92	33.8 QP	43.5	-9.7	2.00 H	137	52.3	-18.5
3	156.35	22.2 QP	43.5	-21.3	2.00 H	106	36.0	-13.8
4	226.33	19.8 QP	46.0	-26.2	1.51 H	118	35.8	-16.0
5	746.50	41.8 QP	46.0	-4.2	1.51 H	106	44.6	-2.8
6	928.00	42.1 QP	46.0	-3.9	1.00 H	143	41.6	0.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	39.72	32.4 QP	40.0	-7.6	1.00 V	10	47.7	-15.3
2	80.54	26.5 QP	40.0	-13.5	1.00 V	76	45.2	-18.7
3	101.92	25.3 QP	43.5	-18.2	2.00 V	189	43.8	-18.5
4	148.58	24.0 QP	43.5	-19.5	1.00 V	235	37.9	-13.9
5	162.18	23.4 QP	43.5	-20.1	1.00 V	114	37.2	-13.8
6	746.95	42.9 QP	46.0	-3.1	1.00 V	334	45.7	-2.8
7	928.00	40.5 QP	46.0	-5.5	1.50 V	146	40.0	0.5

Remarks:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 3 (923.10MHz)	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz (System)	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	16deg. C, 70%RH	TESTED BY	Nick Hsu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	74.65	37.0 QP	40.0	-3.0	1.00 H	148	54.5	-17.5
2	191.34	39.7 QP	43.5	-3.8	1.49 H	214	56.1	-16.4
3	203.01	39.2 QP	43.5	-4.3	1.49 H	220	55.7	-16.5
4	360.46	43.2 QP	46.0	-2.8	1.00 H	171	54.3	-11.1
5	605.39	36.8 QP	46.0	-9.2	1.49 H	209	42.5	-5.7
6	928.00	38.8 QP	46.0	-7.2	2.00 H	19	38.3	0.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	39.72	37.6 QP	40.0	-2.4	1.00 V	231	52.9	-15.3
2	72.77	37.1 QP	40.0	-2.9	1.00 V	113	54.3	-17.2
3	203.01	38.6 QP	43.5	-4.9	1.00 V	181	55.1	-16.5
4	335.19	40.1 QP	46.0	-5.9	1.50 V	145	51.5	-11.4
5	657.88	32.6 QP	46.0	-13.4	1.00 V	64	37.5	-4.9
6	928.00	40.0 QP	46.0	-6.0	2.00 V	19	39.5	0.5

Remarks:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 12, 2015	Oct. 11, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Dec. 26, 2015	Dec. 25, 2016
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 11, 2016	Jan. 10, 2017
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 21, 2015	Jul. 20, 2016
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Shielded Room 2.

3. The VCCI Site Registration No. is C-2047.

4.2.3 Test Procedures

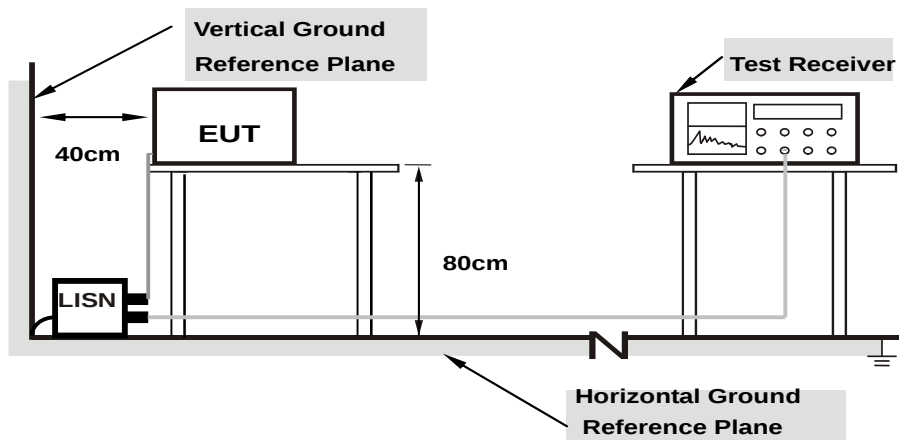
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Conditions

Same as 4.1.6.

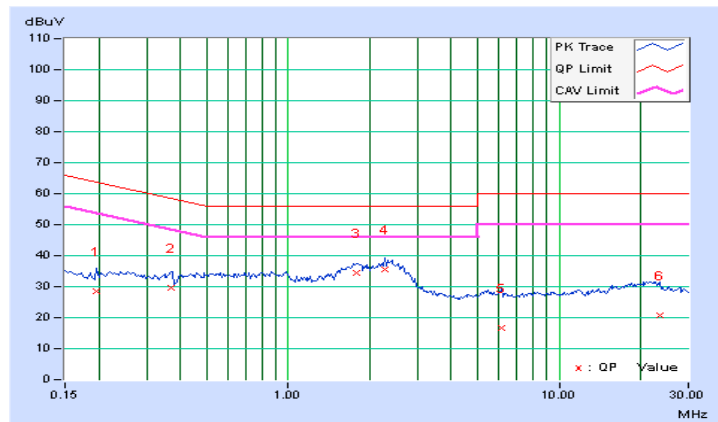
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 1 (920.90MHz)		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.19687	10.16	18.46	13.94	28.62	24.10	63.74	53.74	-35.12	-29.64
2	0.36875	10.19	19.26	14.72	29.45	24.91	58.53	48.53	-29.08	-23.62
3	1.78125	10.27	24.32	20.28	34.59	30.55	56.00	46.00	-21.41	-15.45
4	2.28516	10.29	25.26	20.38	35.55	30.67	56.00	46.00	-20.45	-15.33
5	6.08984	10.40	6.20	2.06	16.60	12.46	60.00	50.00	-43.40	-37.54
6	23.45313	10.54	10.38	6.20	20.92	16.74	60.00	50.00	-39.08	-33.26

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

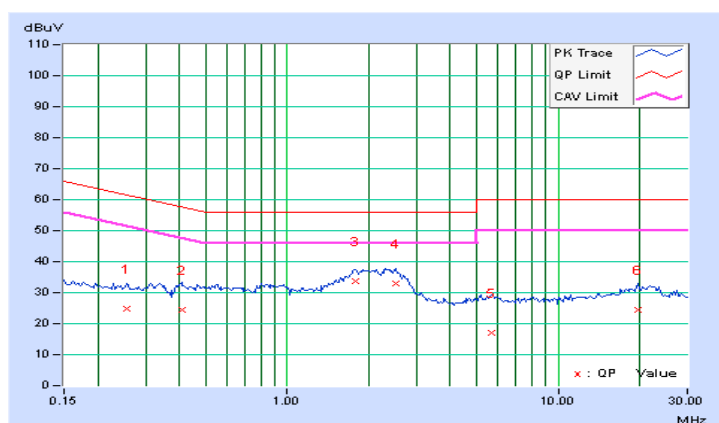


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 1 (920.90MHz)		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.25547	10.17	14.78	11.34	24.95	21.51	61.58	51.58	-36.63	-30.07
2	0.40781	10.19	14.08	9.42	24.27	19.61	57.69	47.69	-33.42	-28.08
3	1.77734	10.28	23.50	20.10	33.78	30.38	56.00	46.00	-22.22	-15.62
4	2.52344	10.32	22.56	18.82	32.88	29.14	56.00	46.00	-23.12	-16.86
5	5.68359	10.44	6.76	3.66	17.20	14.10	60.00	50.00	-42.80	-35.90
6	19.77734	10.78	13.50	8.78	24.28	19.56	60.00	50.00	-35.72	-30.44

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

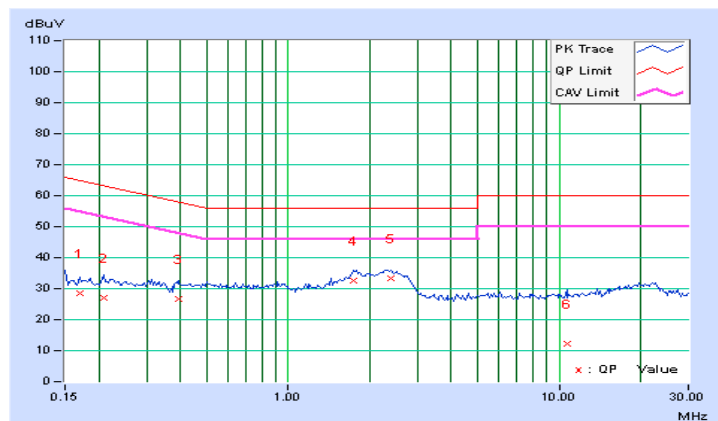


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 2 (921.70MHz)		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16953	10.14	18.30	13.12	28.44	23.26	64.98	54.98	-36.55	-31.73
2	0.20859	10.16	17.04	12.74	27.20	22.90	63.26	53.26	-36.06	-30.36
3	0.39219	10.19	16.66	13.90	26.85	24.09	58.02	48.02	-31.17	-23.93
4	1.75000	10.27	22.32	18.10	32.59	28.37	56.00	46.00	-23.41	-17.63
5	2.39453	10.29	23.00	18.98	33.29	29.27	56.00	46.00	-22.71	-16.73
6	10.66406	10.50	1.84	-1.08	12.34	9.42	60.00	50.00	-47.66	-40.58

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

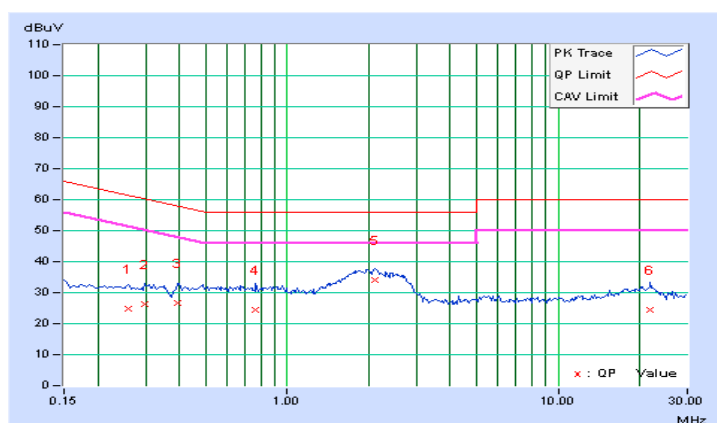


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 2 (921.70MHz)		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.25938	10.17	14.68	11.54	24.85	21.71	61.45	51.45	-36.60	-29.74
2	0.29844	10.17	15.98	11.06	26.15	21.23	60.29	50.29	-34.13	-29.05
3	0.39219	10.19	16.58	13.34	26.77	23.53	58.02	48.02	-31.25	-24.49
4	0.76719	10.20	14.30	10.54	24.50	20.74	56.00	46.00	-31.50	-25.26
5	2.11328	10.31	23.94	20.40	34.25	30.71	56.00	46.00	-21.75	-15.29
6	21.94141	10.74	13.64	9.28	24.38	20.02	60.00	50.00	-35.62	-29.98

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

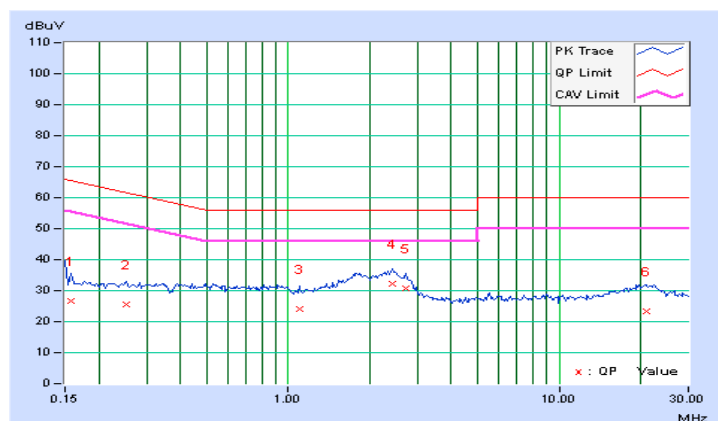


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 3 (923.10MHz)		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
	[MHz]		[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	10.13	16.72	12.56	26.85	22.69	65.58	55.58	-38.73	-32.89
2	0.25156	10.17	15.32	11.88	25.49	22.05	61.71	51.71	-36.22	-29.66
3	1.10547	10.23	13.98	10.68	24.21	20.91	56.00	46.00	-31.79	-25.09
4	2.43359	10.30	21.88	18.44	32.18	28.74	56.00	46.00	-23.82	-17.26
5	2.70703	10.30	20.38	16.64	30.68	26.94	56.00	46.00	-25.32	-19.06
6	20.89453	10.60	12.58	8.14	23.18	18.74	60.00	50.00	-36.82	-31.26

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

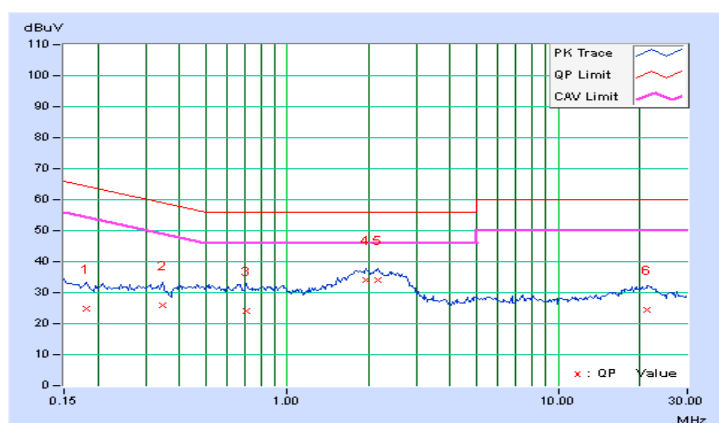


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 3 (923.10MHz)		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18125	10.15	14.84	11.82	24.99	21.97	64.43	54.43	-39.44	-32.46
2	0.34531	10.18	15.86	12.76	26.04	22.94	59.07	49.07	-33.03	-26.13
3	0.70859	10.20	13.84	11.06	24.04	21.26	56.00	46.00	-31.96	-24.74
4	1.95703	10.30	23.86	20.88	34.16	31.18	56.00	46.00	-21.84	-14.82
5	2.15625	10.31	23.72	20.40	34.03	30.71	56.00	46.00	-21.97	-15.29
6	21.40625	10.75	13.82	9.14	24.57	19.89	60.00	50.00	-35.43	-30.11

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



4.3 Band Edge Measurement

4.3.1 Limits of Band Edge Measurement

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 ~ 928 MHz	50	500
2400 ~ 2483.5 MHz	50	500
5725 ~ 5875 MHz	50	500
24 ~ 24.25 GHz	250	2500

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits as below table, whichever is the lesser attenuation

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.3.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Apr. 18, 2016	Apr. 17, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Sep. 02, 2015	Sep. 01, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Jan. 07, 2016	Jan. 06, 2017
HORN Antenna SCHWARZBECK	9120D	209	Jan. 20, 2016	Jan. 19, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Jan. 18, 2016	Jan. 17, 2017
Preamplifier Agilent	8447D	2944A10738	Oct. 18, 2015	Oct. 17, 2016
Preamplifier Agilent	8449B	3008A01964	Aug. 22, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (214378)	Aug. 22, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 106	Cable-CH3-03 (309224+12738)	Aug. 22, 2015	Aug. 21, 2016
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 3.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 988962.
5. The IC Site Registration No. is IC 7450F-3.

4.3.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

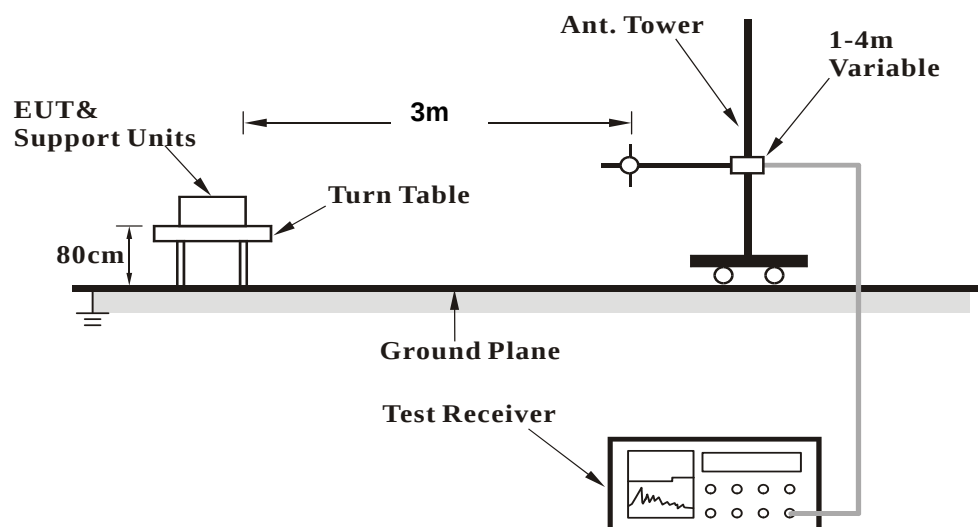
Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz(Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.3.4 Deviation from Test Standard

No deviation.

4.3.5 Test Set Up



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.3.6 EUT Operating Conditions

Same as 4.1.6.

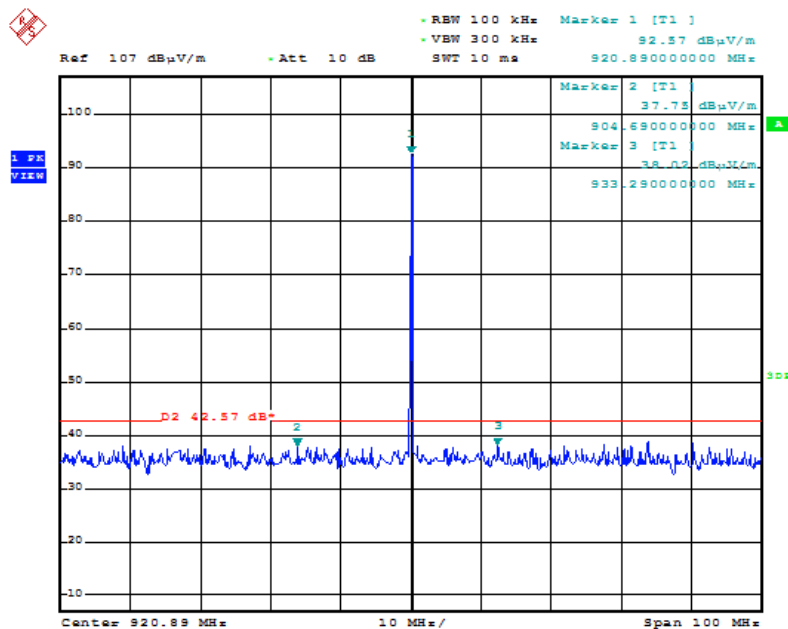
4.3.7 Test Results

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1 (920.90MHz)	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz (System)	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	16deg. C, 70%RH	TESTED BY	Nick Hsu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	904.69	37.75 PK	42.6	-4.85	1.53 H	136	9.45	28.3
2	*920.90	92.57 PK			-	-	64.07	28.5
3	933.29	38.02 PK	42.6	-4.58	1.53 H	136	9.32	28.7

Remarks:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “*”: Fundamental frequency



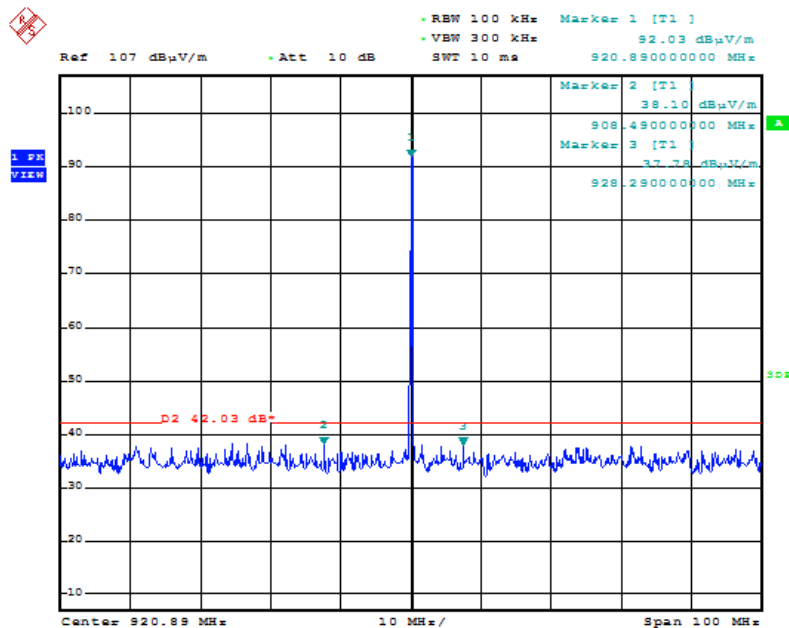
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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1 (920.90MHz)	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz (System)	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	16deg. C, 70%RH	TESTED BY	Nick Hsu

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	908.49	38.10 PK	42.0	-3.90	1.03 V	164	9.80	28.3
2	*920.90	92.03 PK			-	-	63.53	28.5
3	928.29	37.78 PK	42.0	-4.22	1.03 V	164	9.08	28.7

Remarks:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “*”: Fundamental frequency



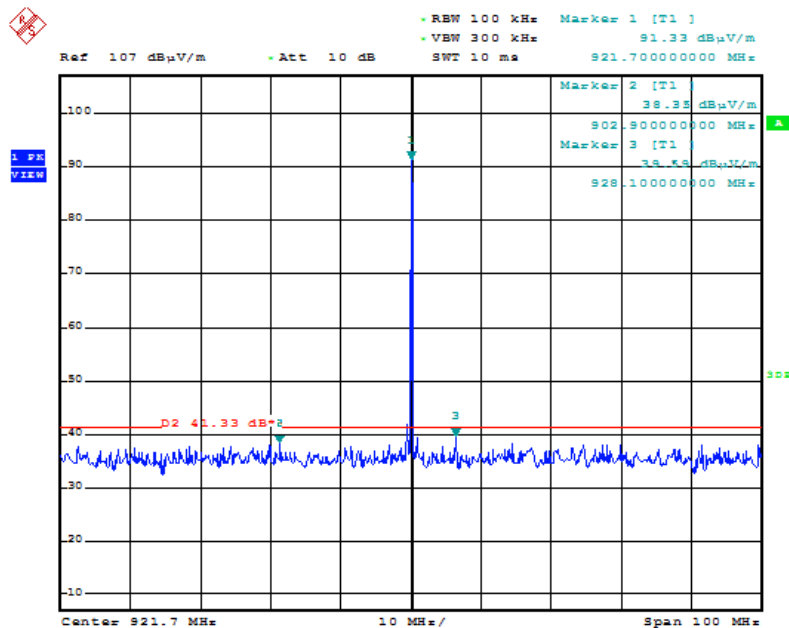
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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 2 (921.70MHz)	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz (System)	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	16deg. C, 70%RH	TESTED BY	Nick Hsu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	902.90	38.35 PK	41.3	-2.95	1.52 H	133	10.05	28.3
2	*921.70	91.33 PK			-	-	62.83	28.5
3	928.10	39.59 PK	41.3	-1.71	1.52 H	133	10.89	28.7

Remarks:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “*”: Fundamental frequency



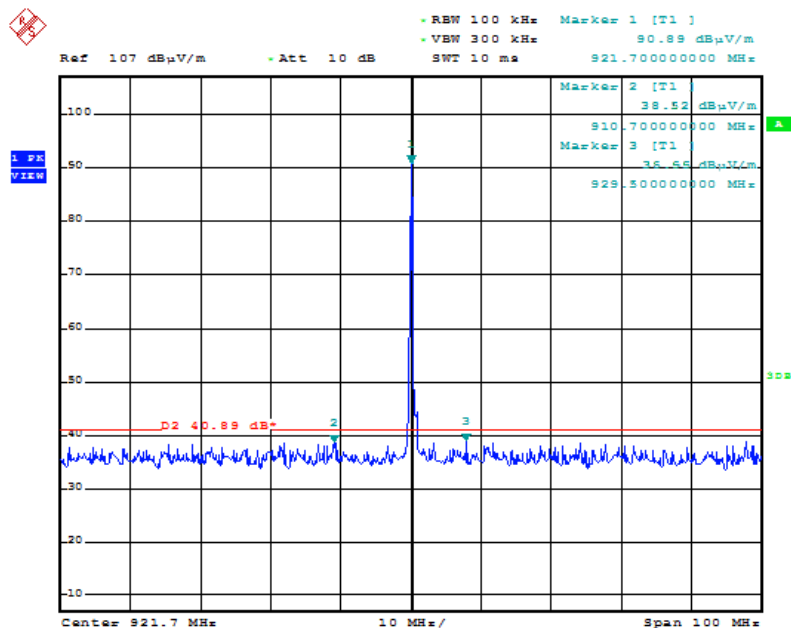
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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 2 (921.70MHz)	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz (System)	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	16deg. C, 70%RH	TESTED BY	Nick Hsu

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	910.70	38.52 PK	40.9	-2.38	1.00 V	163	10.22	28.3
2	*921.70	90.89 PK			-	-	62.39	28.5
3	929.50	38.95 PK	40.9	-1.95	1.00 V	163	10.25	28.7

Remarks:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “*”: Fundamental frequency



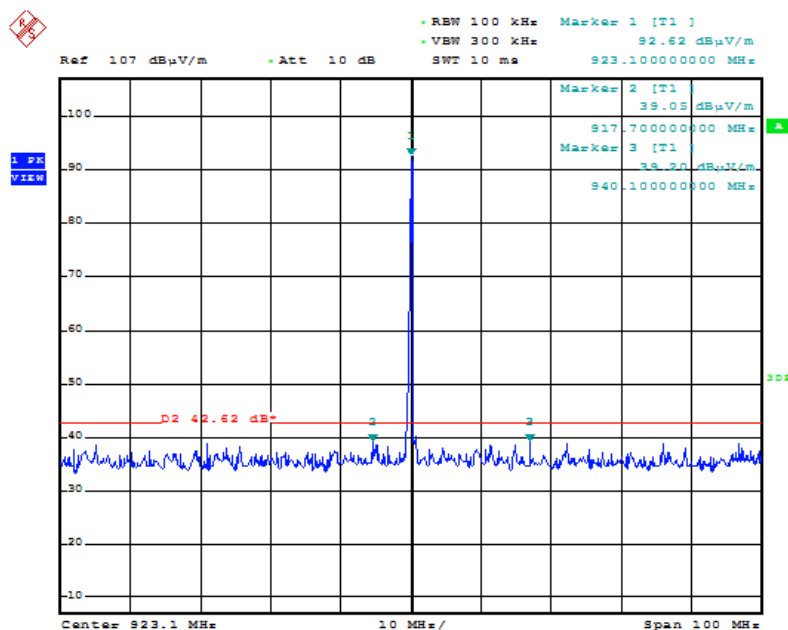
Date: 3.JUN.2016 13:07:26

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 3 (923.10MHz)	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz (System)	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	16deg. C, 70%RH	TESTED BY	Nick Hsu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	917.70	39.05 PK	42.6	-3.55	1.48 H	132	10.65	28.4
2	*923.10	92.62 PK			-	-	64.12	28.5
3	940.10	39.20 PK	42.6	-3.40	1.48 H	132	10.60	28.6

Remarks:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “*”: Fundamental frequency

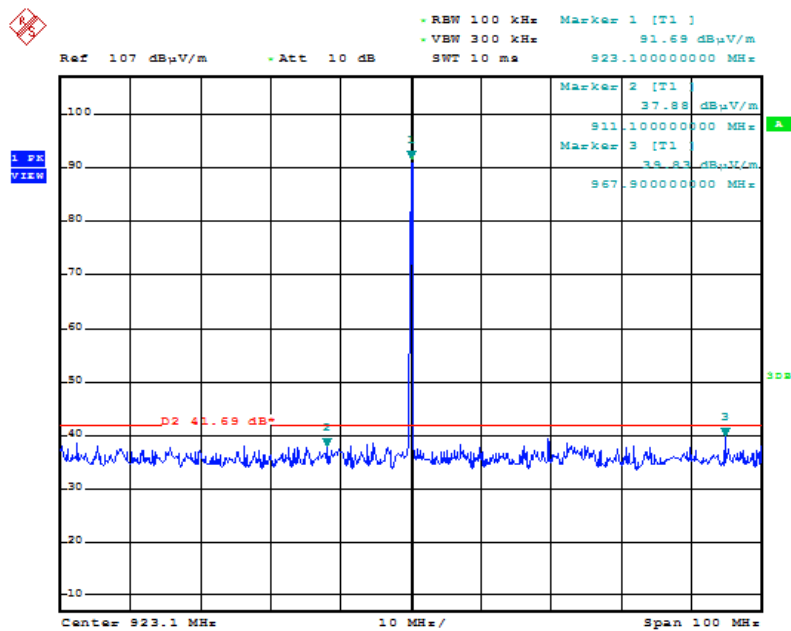


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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 3 (923.10MHz)	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz (System)	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	16deg. C, 70%RH	TESTED BY	Nick Hsu

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	911.10	37.88 PK	41.7	-3.82	1.01 V	163	9.58	28.3
2	*923.10	91.69 PK			-	-	63.19	28.5
3	967.90	39.83 PK	41.7	-1.87	1.01 V	163	10.93	28.9

- REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * ” : Fundamental frequency



Date: 3.JUN.2016 13:21:39

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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